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Simulation and Education

Rescuing A Patient In Deteriorating Situations (RAPIDS): An evaluation tool for assessing simulation performance on clinical deterioration☆

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ABSTRACT

Aim: This article is a report of a study which developed and tested the validity and reliability of the RAPIDS-Tool to measure student nurses' simulation performance in assessing, managing and reporting of clinical deterioration.
Background: The importance for nurses to recognize and respond to deteriorating patients has led educators to advocate for increasing use of simulation for developing this competency. However, there is a lack of evaluation tools to objectively evaluate nurses' simulation performance on clinical deterioration.
Method: The study was conducted in three phases. Phase 1 began with development of items for the RAPIDS-Tool from the basis of a literature review and a panel of national experts' consensus. Phase 2 established the content validity of the RAPIDS-Tool by a panel of international experts and by undertaking a pilot test. Phase 3 involved testing the psychometric properties of the RAPIDS-Tool, on 30 video-recorded simulation performances, for construct validity, inter-rater reliability, and correlation between two scoring systems.
Results: The process of development and validation produced a 42-item RAPIDS-Tool. Significant differences ($t = 15.48$, $p < 0.001$) in performance scores among participants with different levels of training supported the construct validity. The RAPIDS-Tool demonstrated a high inter-rater reliability (ICC = 0.99) among the three raters and a high correlation between the global rating and checklist scores ($r = 0.94$, $p < 0.001$).
Conclusion: The RAPIDS-Tool provides a valid and reliable tool to evaluate nurses' simulation performances in clinical deterioration. This may prove useful for future studies that investigate outcomes of simulation training.

1. Introduction

The acute care initiatives including medical emergency team (MET) or Rapid Response Team (RRT) were developed to reduce hospital cardiopulmonary arrest events.[1] Their effectiveness could be enhanced by more frequent monitoring and timely activation of MET/RRT in response to patient deterioration, which are components of nurses' roles.[2,3] Nurses play an important role in performing physical assessment to detect patient's signs of deterioration.[4,5] In response to the assessment findings, the nurses are in a pivotal position to provide timely and appropriate nursing interventions to prevent progression of life-threatening complications.[6,7]

Educational programmes have been implemented to train medical and nursing staff to recognise and manage critically ill patients.[8,9] Supported by the Resuscitation Council (2006),[10] these interprofessional programmes utilize the mnemonic "ABCDE" (Airway, Breathing, Circulation, Disability & Exposure/Examine) as a systematic approach to assess and manage ward deteriorating patient.[8,11,12] Although this mnemonic has also been recommended as a tool to guide nurses to perform nursing assessment and initiate immediate nursing intervention before the arrival of appropriate help,[7,13] there appears to be a lack of evidence-based recommendation of a standardized ABCDE mnemonic within the scope of nursing practice.

After assessing that a patient is acutely ill, nurses play an important role in reporting their findings effectively to the doctor or the MET.[4] Nurses are encouraged to use the mnemonic SBAR (Situation, Background, Assessment & Recommendation) when reporting about a patient's condition (Joint Commission Resources 2008). The SBAR is described as communicating about a patient's present situation (S), providing clinical background (B) information, the

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assessment (A) of the problem and making possible recommendations (R).[14,15] This SBAR mnemonic was identified as the most frequently cited handoff mnemonic[16] and is used as a tool to train effective communication within interprofessional teams on patients' deterioration.[8,17]

The ABCDE and SBAR mnemonics could be incorporated into simulation programmes as frameworks for nursing assessment, management and reporting of patients' deterioration. To evaluate the effectiveness of the simulation programme, there is a need for a reliable and valid evaluation to measure the nurses' performances. Only two studies were identified in nursing education that developed and tested an instrument to measure simulation performance. Arnold et al.[18] developed an emergency response performance tool (ERPT) for evaluating nurses' performances during a simulated cardiac arrest event. Todd et al.[19] developed a Simulation Evaluation Instrument (SEI) that evaluated simulation performances in four nursing domains (assessment, communication, critical thinking and technical skills). While the ERPT mnemonic is used specifically for a simulated cardiac arrest event, the SEI is used for evaluating any simulation scenario. As a result of its non-specificity, the SEI did not achieve acceptable inter-rater reliability ratings for some items.

A recent review of published evaluation instruments for simulation highlighted that a lack of reliable and valid instruments to measure simulation learning outcomes has impeded the progression of simulation in nursing education.[20] With the increasing use of simulation in developing nurses' abilities in identifying and managing "at risk" patients,[11,21,22] a reliable and valid instrument to assess the learning outcome would be valuable to nursing education.

2. Aim

The aim of the study was to develop and test the validity and reliability of the RAPIDS-Tool to measure student nurses' simulation performances in assessing, managing and reporting of clinical deterioration.

3. Methods

This methodological study was conducted in three phases from June to December 2009. Prior to data collection, the study was approved by a University Institutional Review Board (IRB). Phase 1 began with identifying items within the ABCDE and SBAR domains from the basis of a literature review and a panel of national experts. Phase 2 focused on testing the content validity of the items by a panel of international experts and by a pilot testing. Phase 3 involved testing the psychometric properties of the RAPIDS-Tool by determining the construct validity, inter-rater reliability, and correlation between scoring systems.

3.1. Phase 1: items development

The first step in the process of developing RAPIDS-Tool was to identify items within the ABCDE and SBAR mnemonics. This was conducted by the authors through an extensive literature review, including published papers, nursing textbooks and existing educational programmes. There is considerable published literature that addresses the use of the ABCDE mnemonic in international hospital settings.[7,8,11] Jevon[7] developed a detailed description on the list of assessment tasks to be undertaken by nurses using the systematic ABCDE approach. An algorithm developed for the Acute Illness Management (AIM) interprofessional course has perhaps demonstrated the most comprehensive use of the mnemonic ABCDE as it contains a list of tasks to guide assessment as well as management of acute ill patients. Although originally developed by North West Strategic Health Authority to train qualified health professionals, the algorithm was adopted by the University of Manchester for a pre-registered nursing programmes.[11]

While the review reported a variation of items within the ABCDE mnemonic, the items used in the SBAR mnemonic are more specific and standardized. Only those items that are relevant for nurses to make rapid assessment and management within their scope of practice were included in the item pool. After reviewing the existing literature, an initial RAPIDS-Tool was developed. This was reviewed and further developed by a panel of national experts who came together to discuss the suitability of the items to be performed by ward nurses in response to patient deterioration. Among the national experts, two were nursing educators with critical care nursing experiences from a university and three were clinicians of a hospital's MET team (an anaesthetist, a respiratory physician, an intensive care nurse and an emergency nurse).

Drawing upon the literature review and experts' consensus, the RAPIDS-Tool was developed comprising of 27 items in five categories (Airway, Breathing, Circulation, Disability & Expose/Examine) and four items in four categories (Situation, Background, Assessment & Recommendation).

3.2. Phase 2: content validity testing

3.2.1. A panel of international experts

The 31-items RAPIDS-Tool was assessed by an international panel (Australia, United Kingdom, Denmark, Italy and Korea) of nursing and medical experts in the field of intensive care medicine and critical care nursing. These experts were identified by the author from relevant published papers or from a conference on Rapid Response System. The experts comprised four doctors and three nurses, who have clinical experience relating to the assessment and management of deteriorating patients. An individual email was sent to them to ask them to rank each RAPIDS-Tool item according to its relevancy on a four-point scale (1 = not relevant, to 4 = very relevant), to provide comments to the items and to suggest addition items to for RAPIDS-Tool.

Using their ratings, item-level content validity index (I-CVI) was computed for each item. The I-CVI was computed by the number of experts giving a rating of either 3 or 4 and divided by the total number of experts.[23] Three out of the 31 RAPIDS-Tool items were rated as I-CVI of 0.71, six rated as I-CVI of 0.86 and the remaining items were rated as I-CVI of 1. Based on Lynn's recommendation,[23] a minimum I-CVIs of 0.78 is required for six or more experts. Apart from using the I-CVI information, the decisions to remove the 3 items with I-CVI lower than 0.78 were made based on the qualitative information gathered from the international experts' written comments. Major wording revisions were made to several items according to the experts' qualitative suggestions. The process of reduction, addition and revision resulted in the 34-items RAPIDS-Tool. This revised RAPIDS-Tool, along with the qualitative comments, were sent for second round of expert validation, which yielded a minimum I-CVI of 0.88 for each item and S-CVI of 0.99 for the overall scale.

3.2.2. Pilot testing for further validation

The researchers recruited a convenience sample of six fourth year nursing students, undertaking the Bachelor of Science (Nursing) course at a University, who gave written consent to participate a pilot simulation-based assessment. Following an orientation in the simulation laboratory and receiving clinical history of a case scenario, each participant was given specific instructions before undertaking the test. They were instructed to: (a) act as a staff